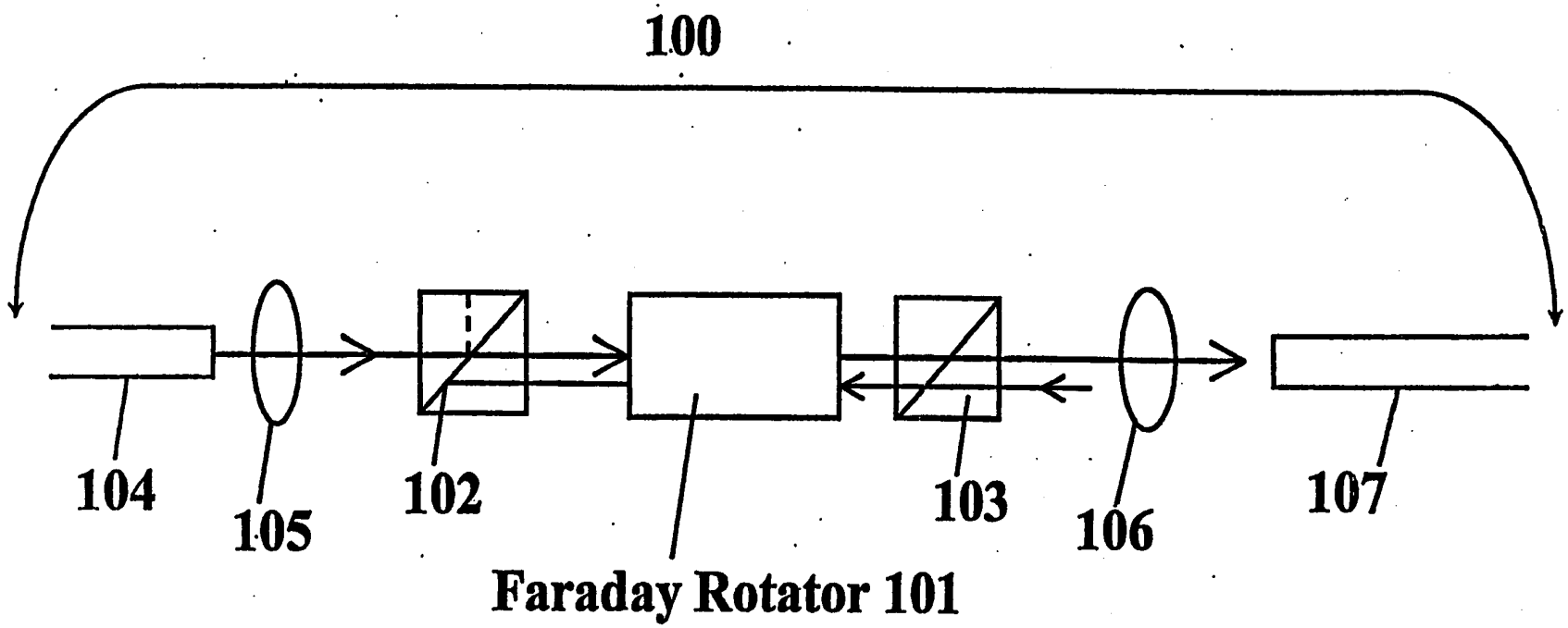


Figure 1
PRIOR ART

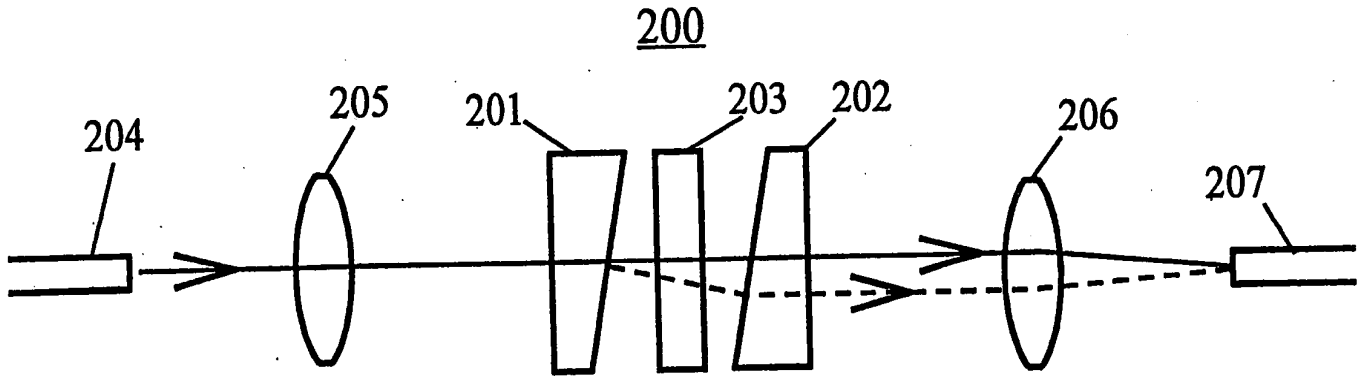


Figure 2A
PRIOR ART

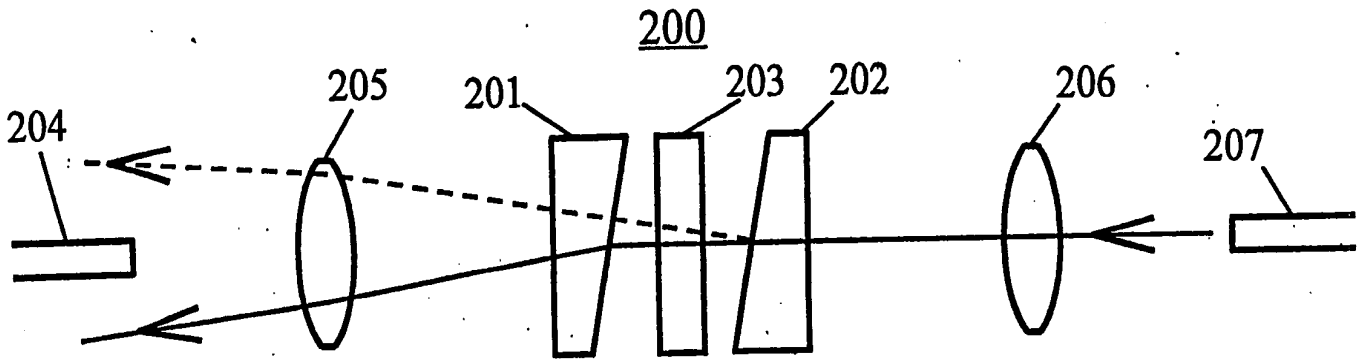


Figure 2B
PRIOR ART

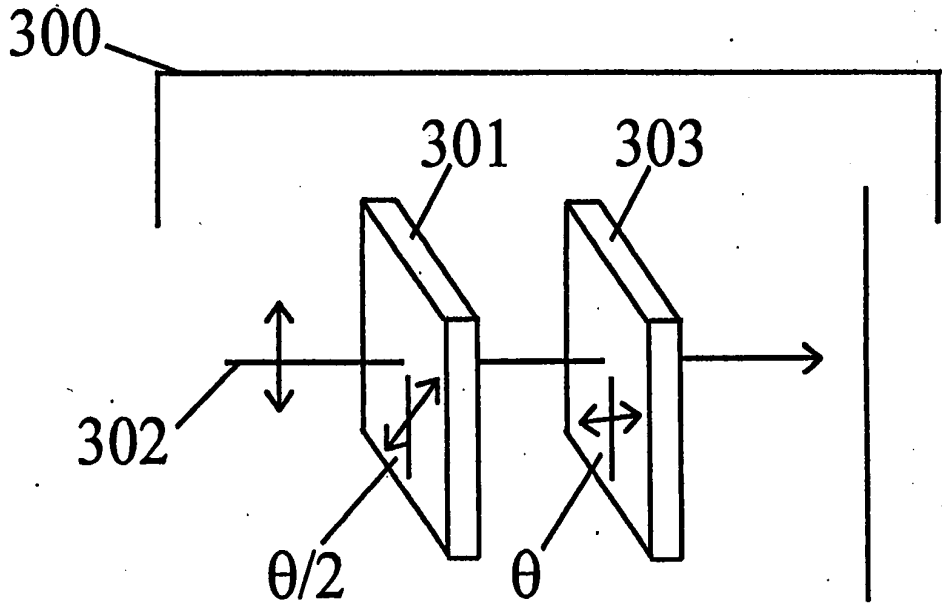


Figure 3A
PRIOR ART

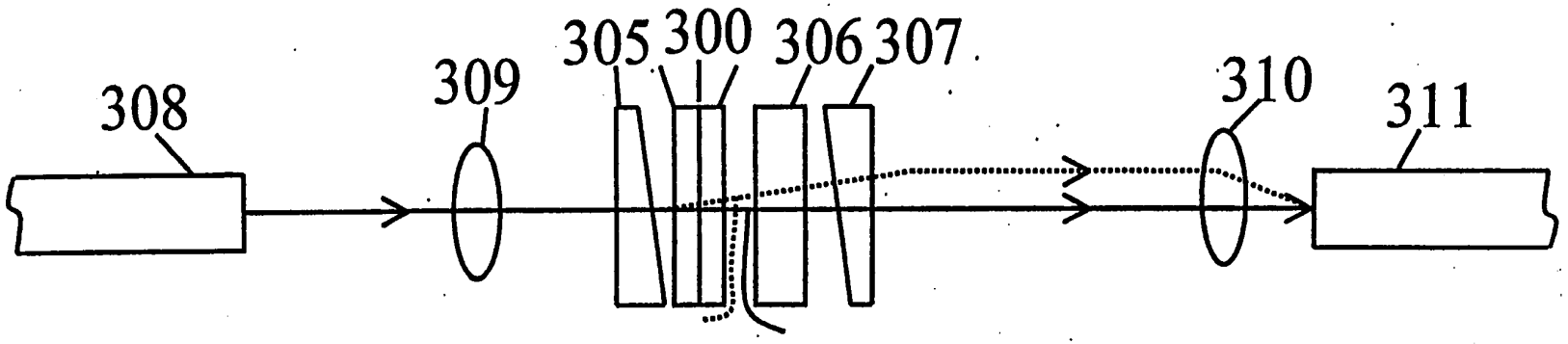


Figure 3B
PRIOR ART

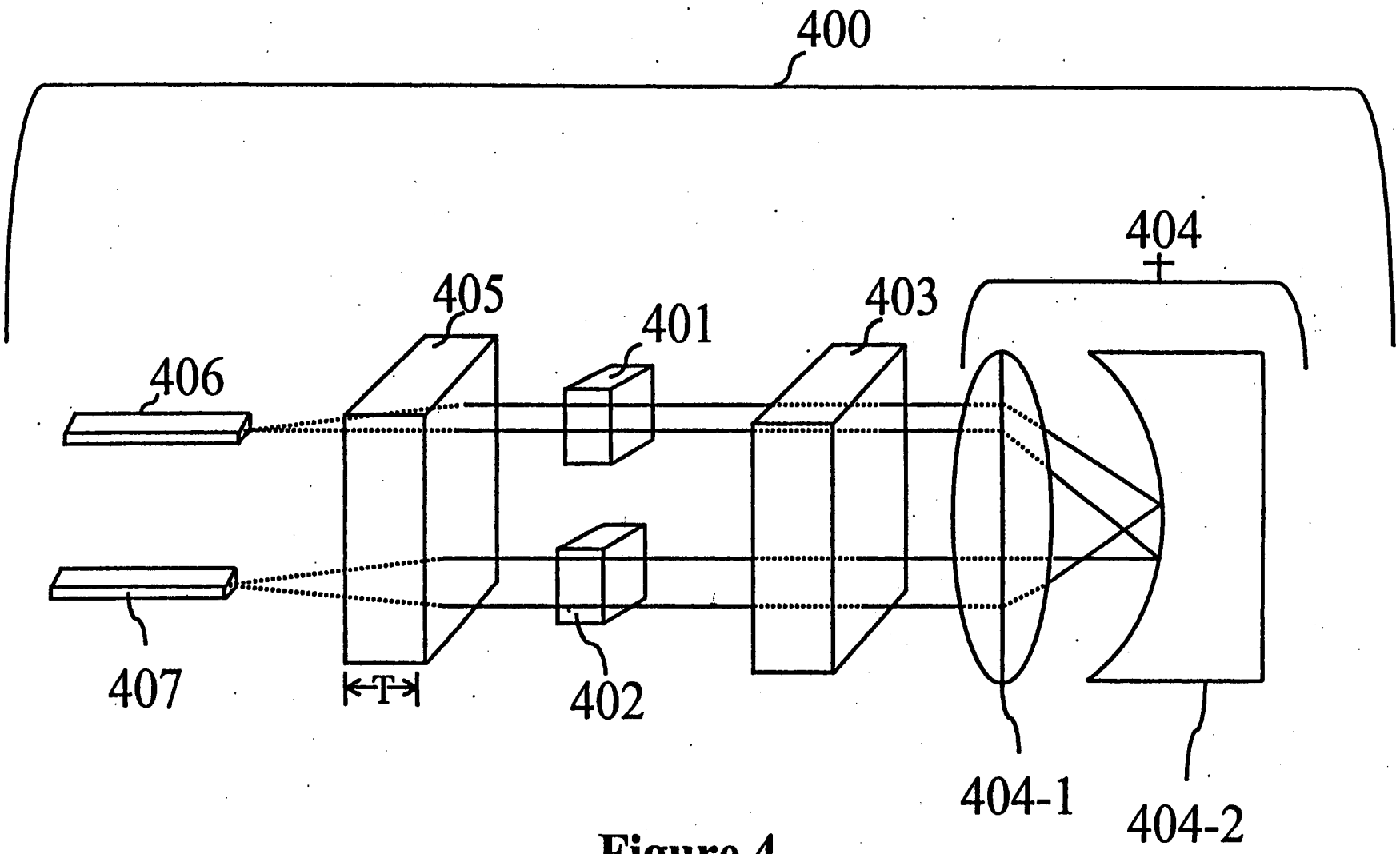


Figure 4
PRIOR ART

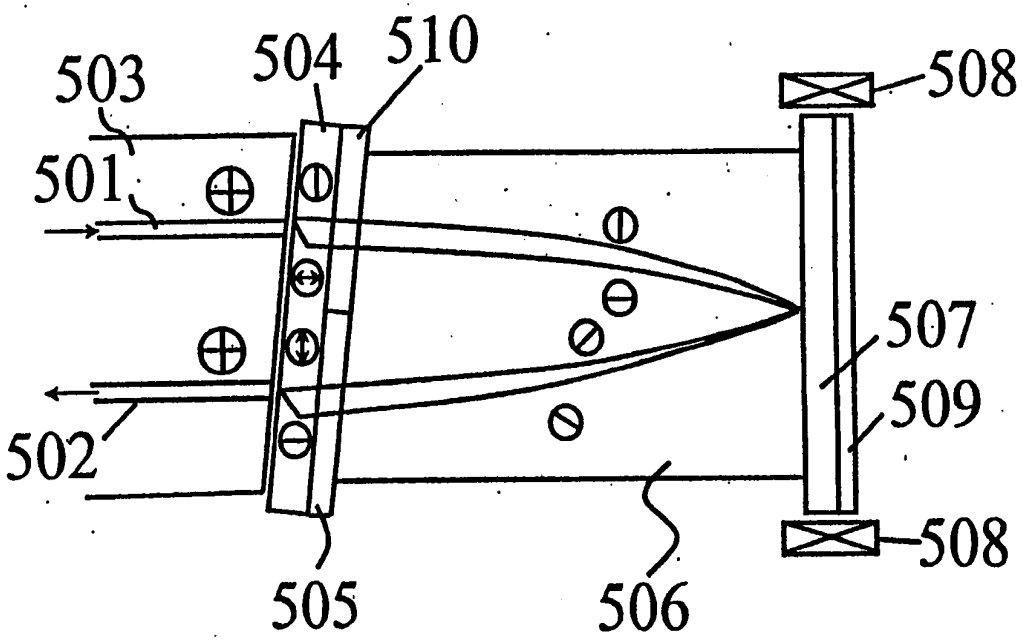


Figure 5A
PRIOR ART

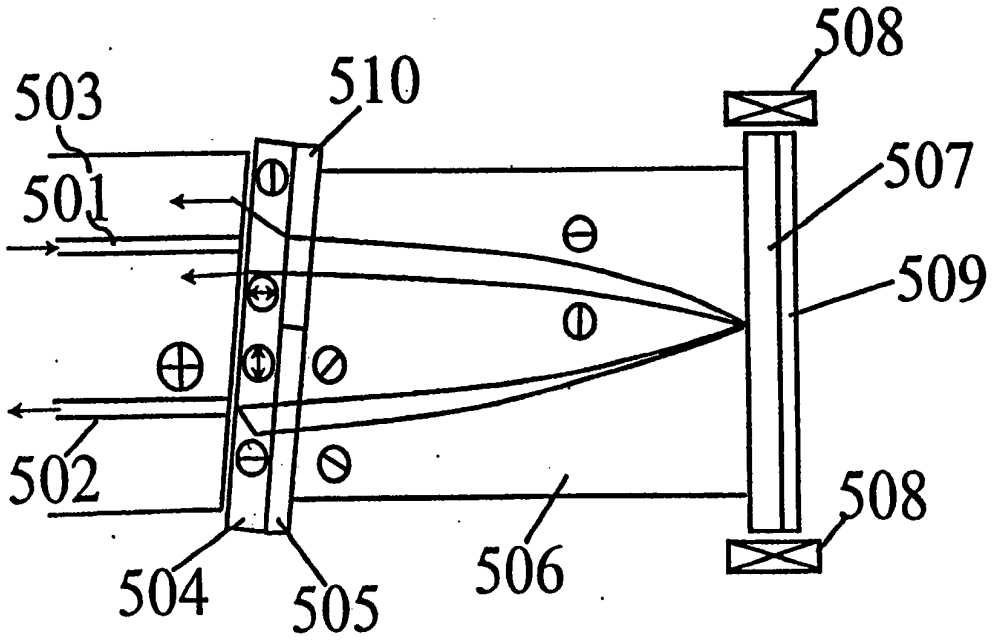


Figure 5B
PRIOR ART

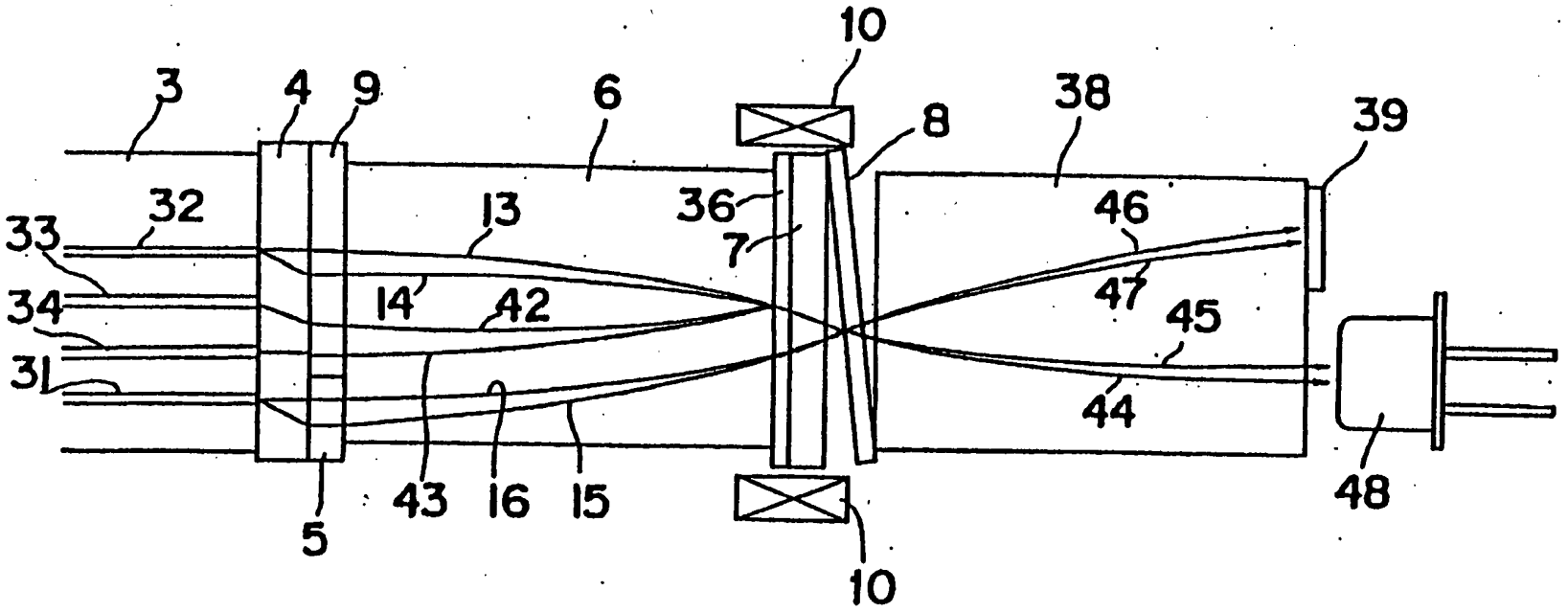


Figure 6

PRIOR ART

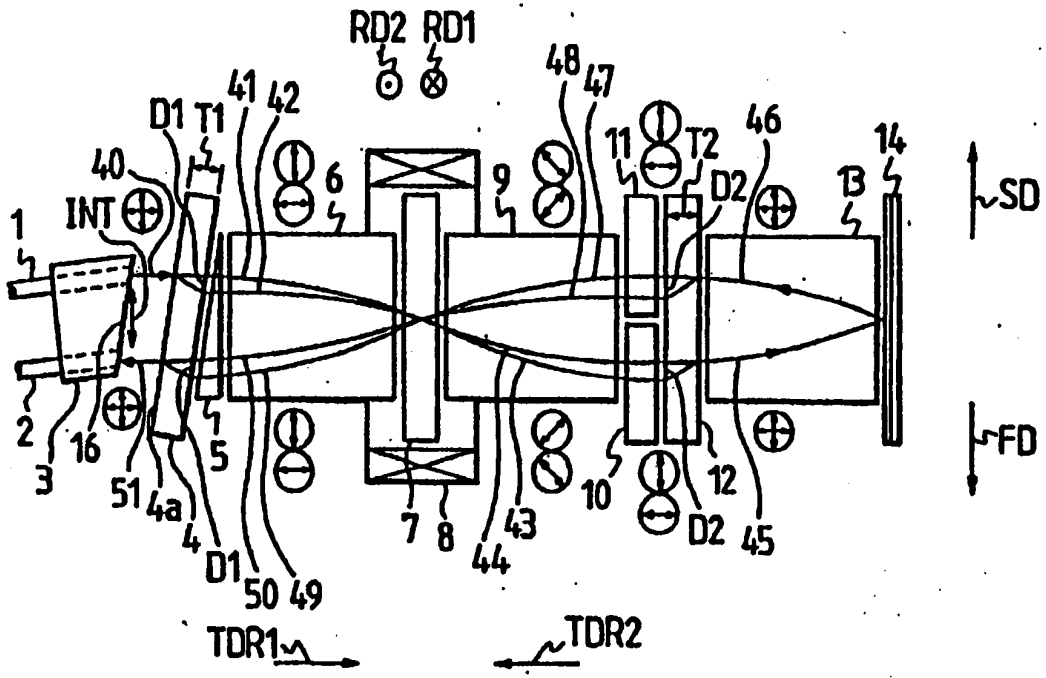


Figure 7

PRIOR ART

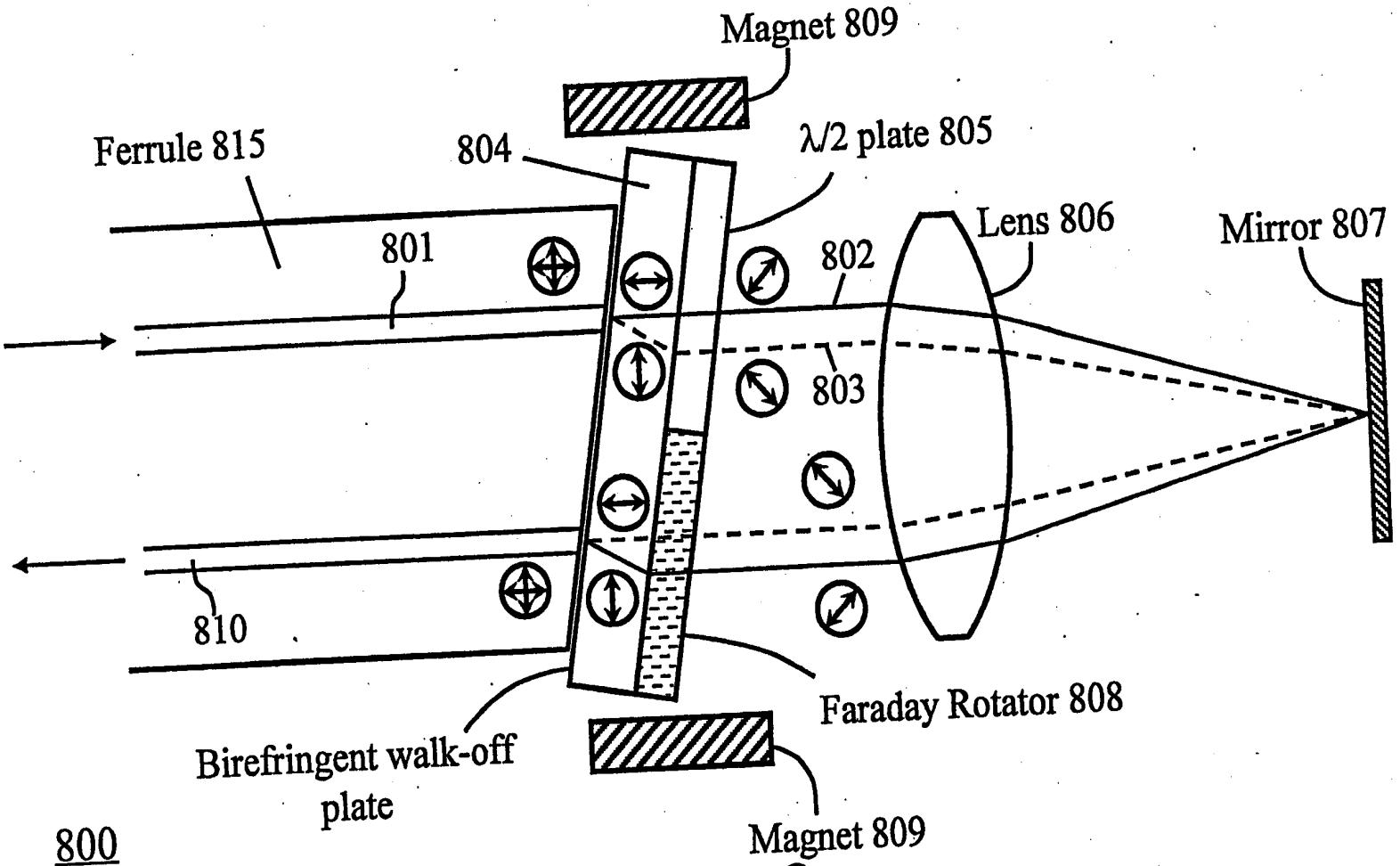

Magnet 809
Ferrule 815
804
λ/2 plate 805
Lens 806
Mirror 807
801
802
803
810
Faraday Rotator 808
Birefringent walk-off plate
Magnet 809
800

Figure 8a

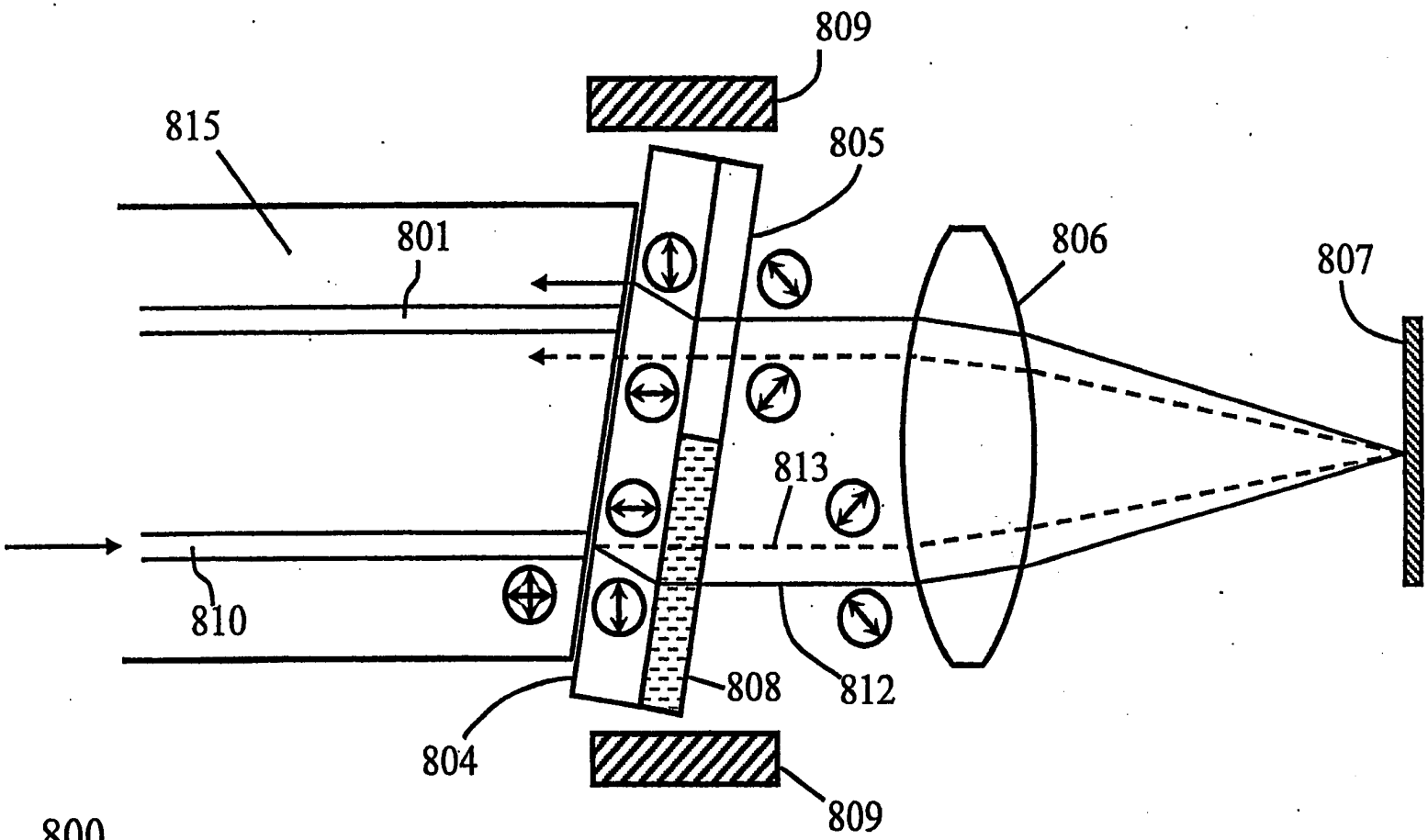


Figure 8b

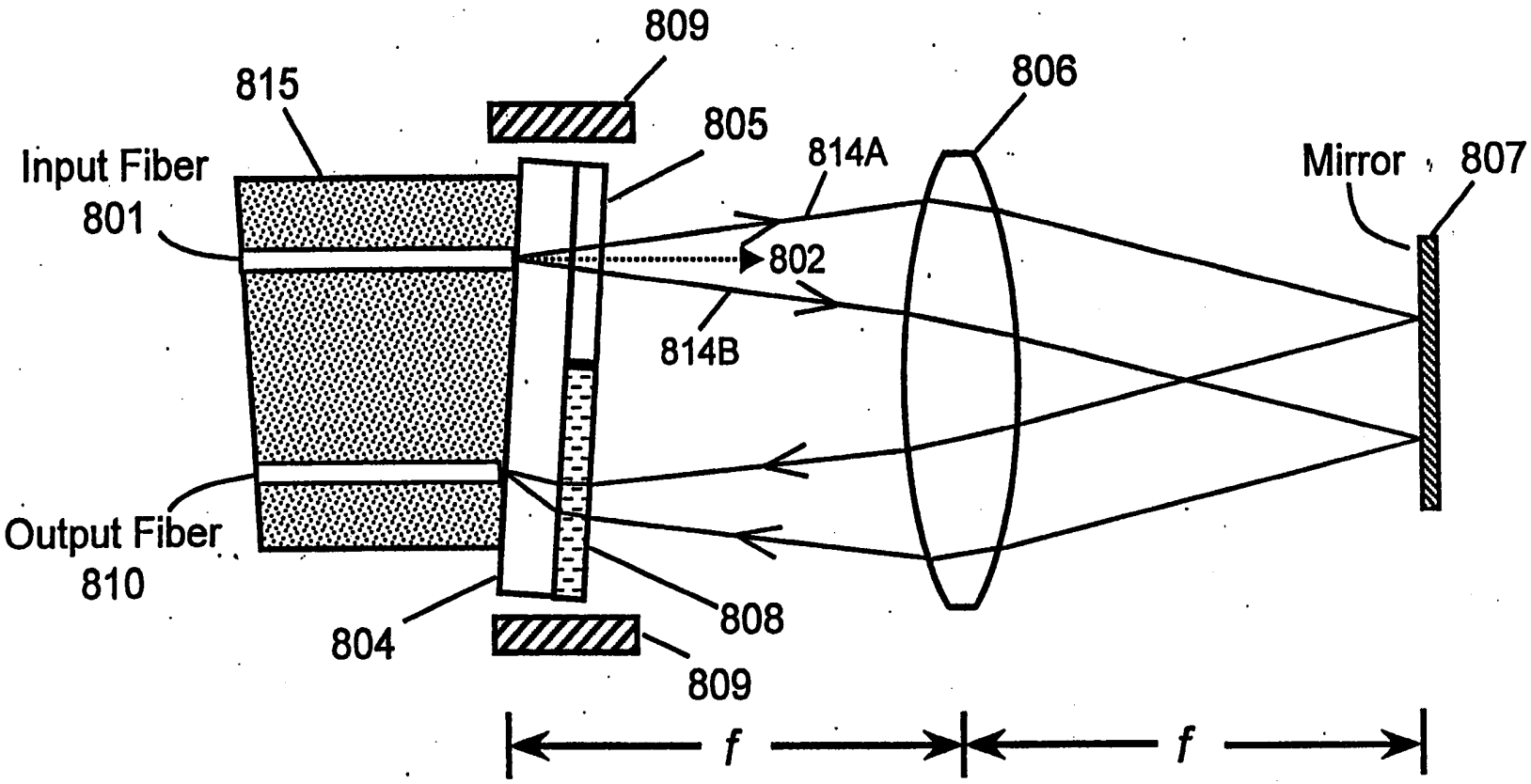

809
815
806
805
814A
Input Fiber
801
Mirror
807
802
814B
Output Fiber
810
808
804
809
f
f

Figure 9

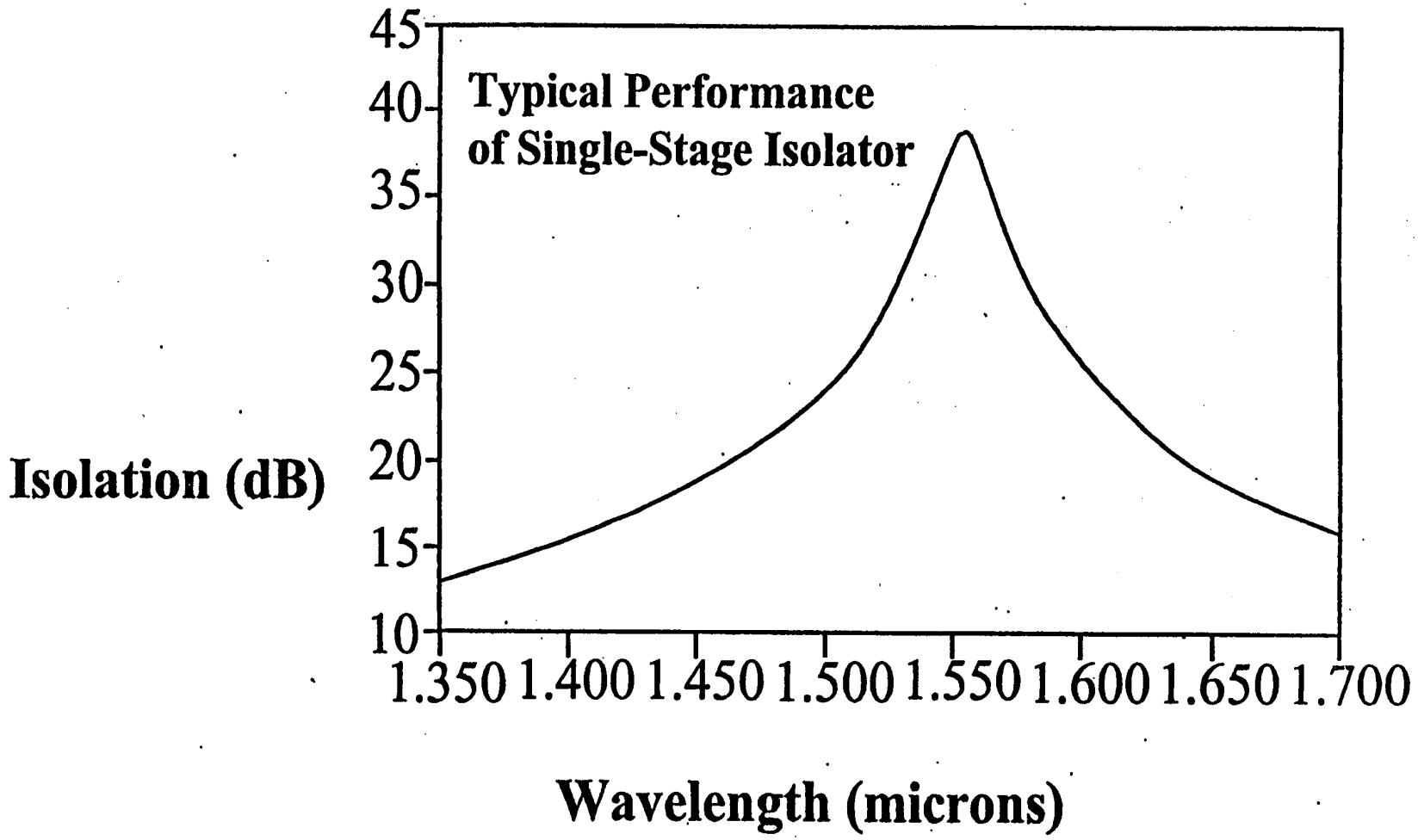


Figure 10
PRIOR ART

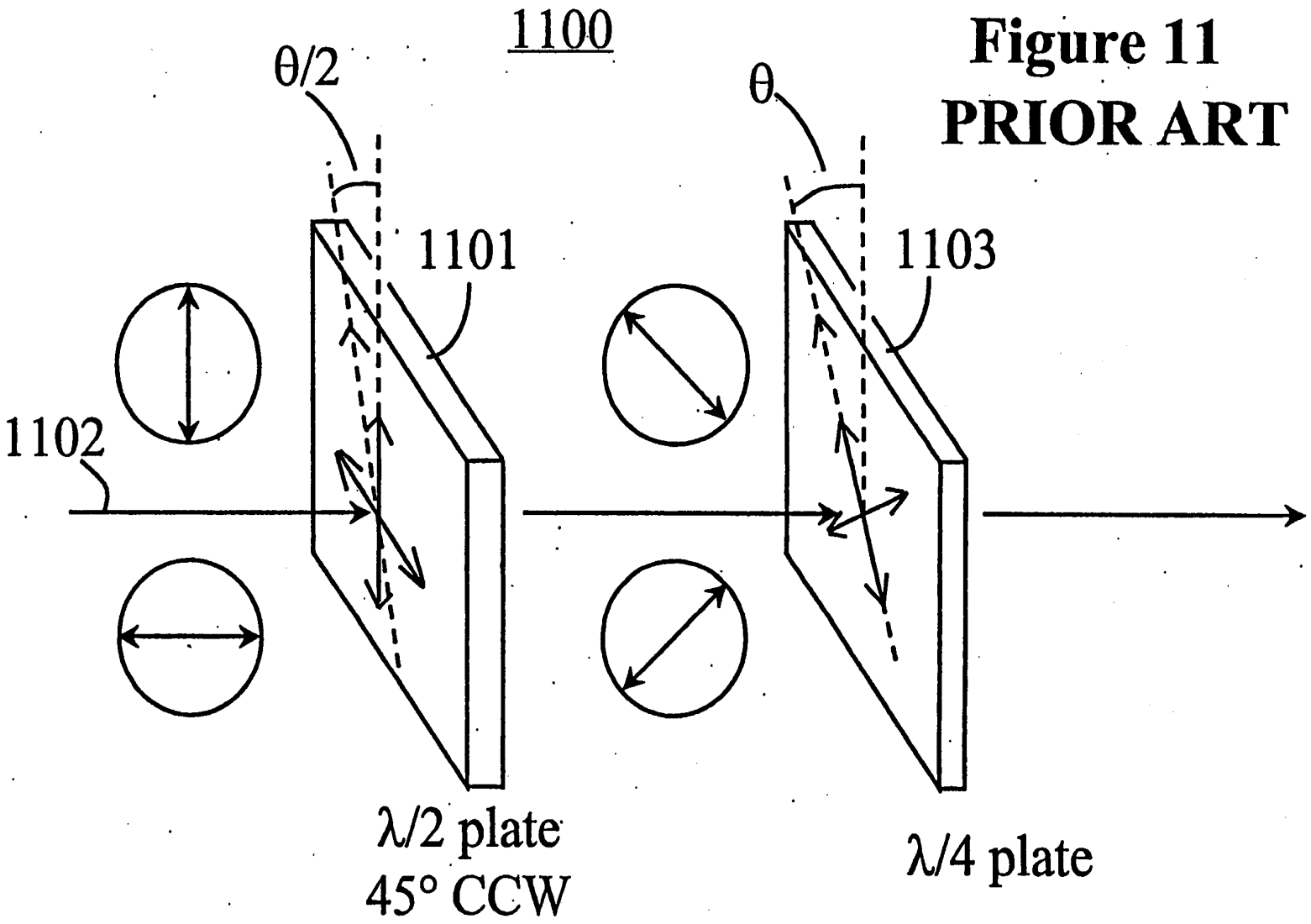
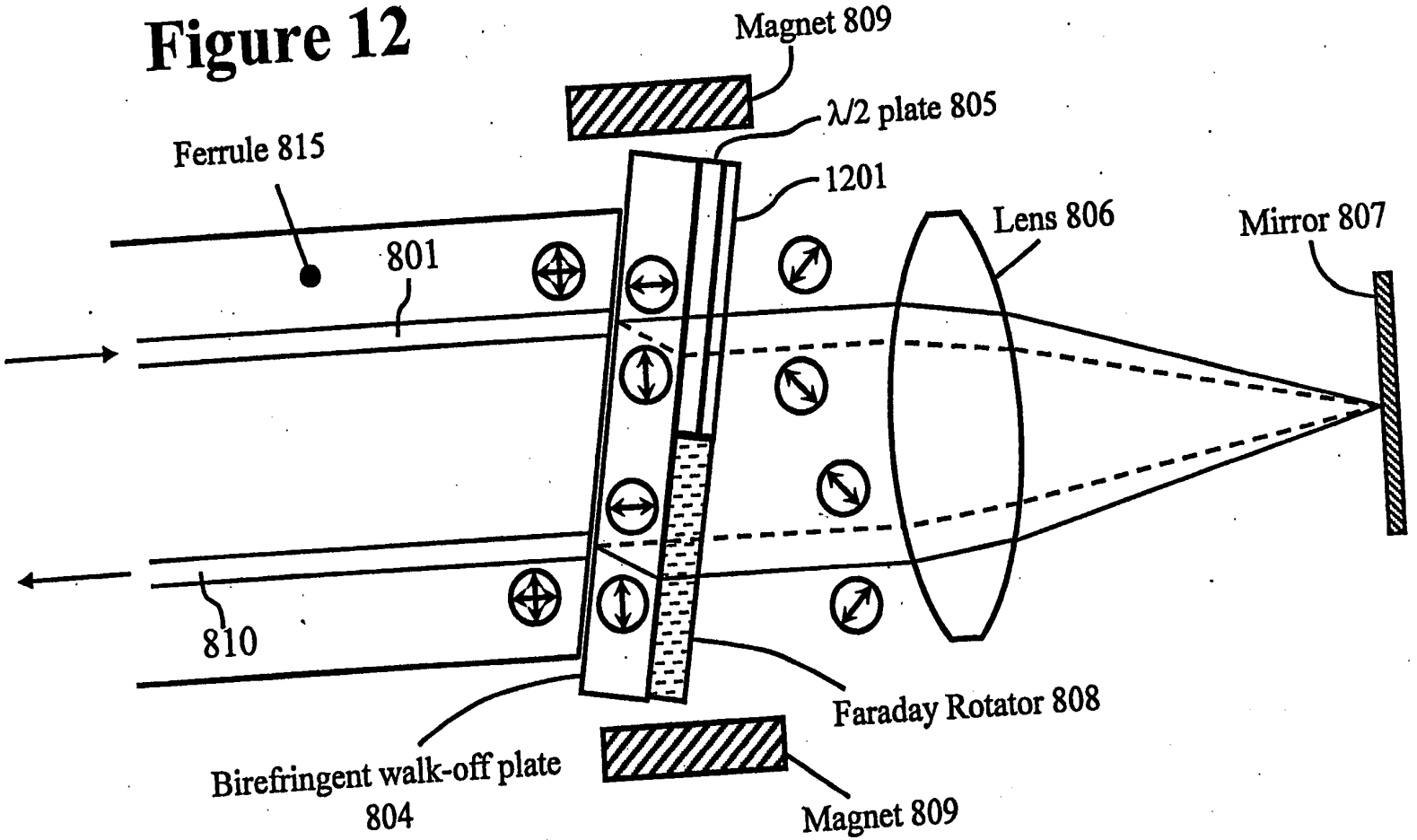


Figure 11
PRIOR ART

Figure 12



1200

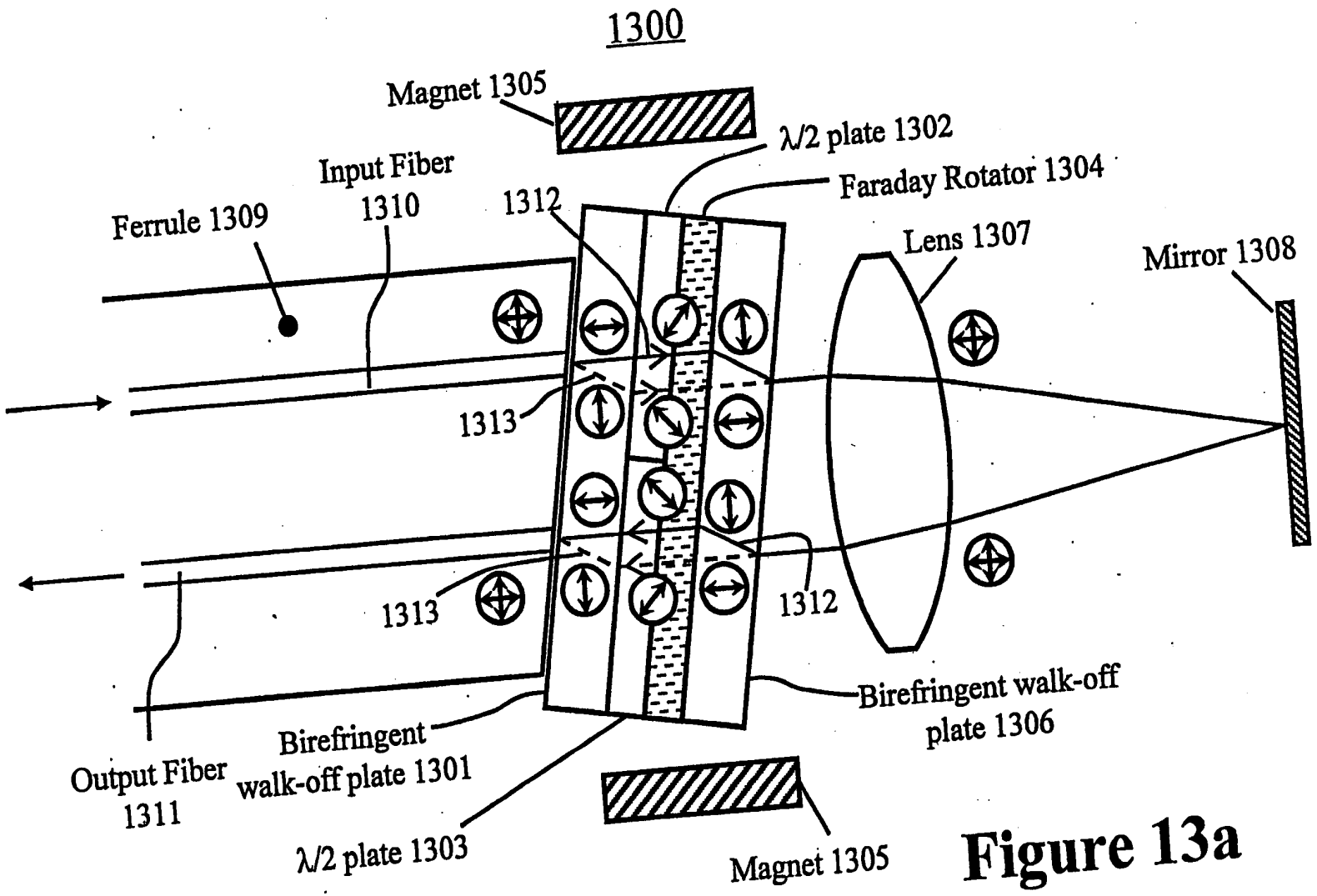

1300
Magnet 1305
λ/2 plate 1302
Input Fiber
1310
Faraday Rotator 1304
Ferrule 1309
1312
Lens 1307
Mirror 1308
1313
1313
1312
Birefringent walk-off
plate 1306
Birefringent
walk-off plate 1301
Output Fiber
1311
λ/2 plate 1303
Magnet 1305

Figure 13a

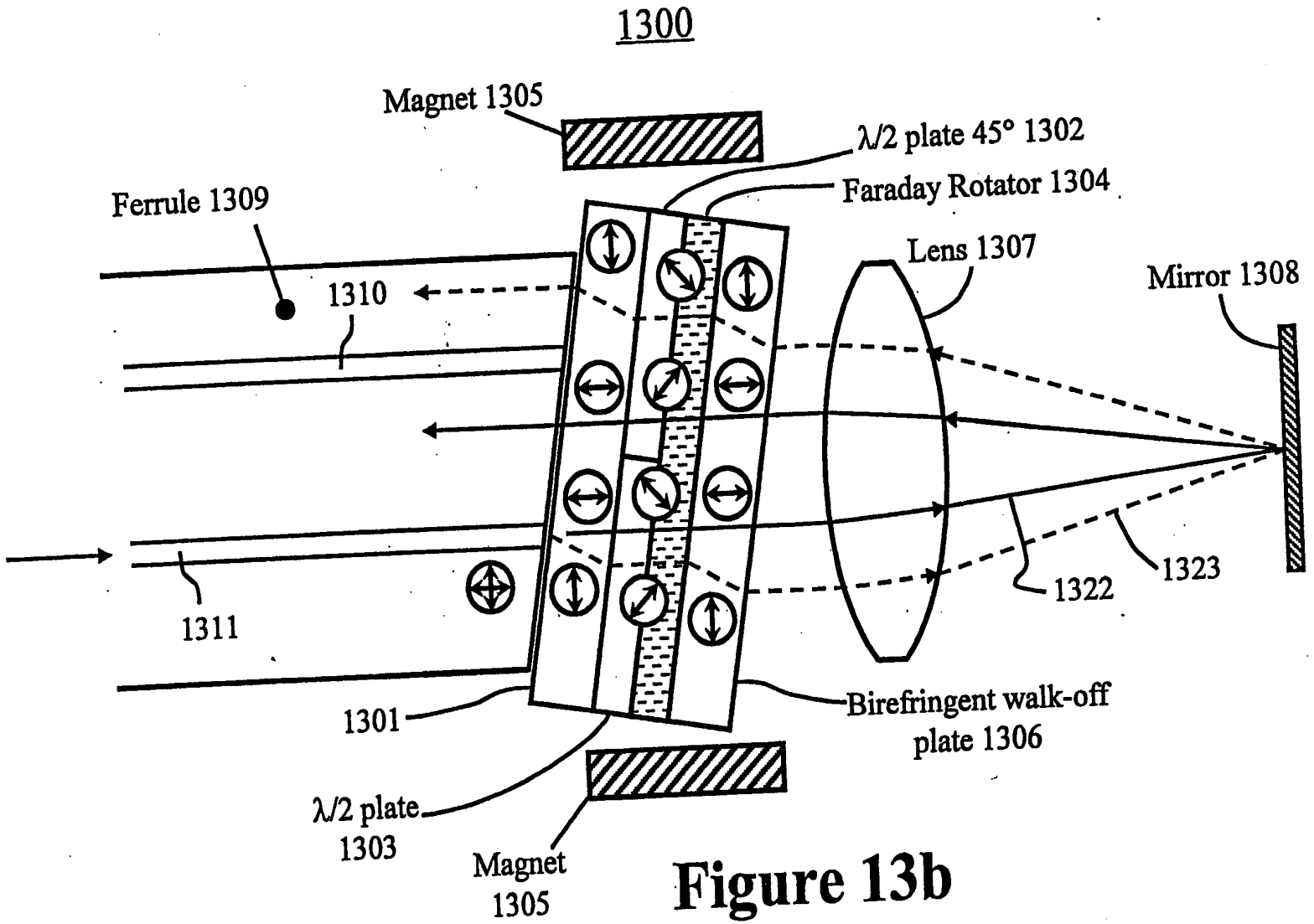

1300
Magnet 1305
λ/2 plate 45° 1302
Faraday Rotator 1304
Ferrule 1309
Lens 1307
Mirror 1308
1310
1311
1322
1323
1301
Birefringent walk-off plate 1306
λ/2 plate 1303
Magnet 1305

Figure 13b

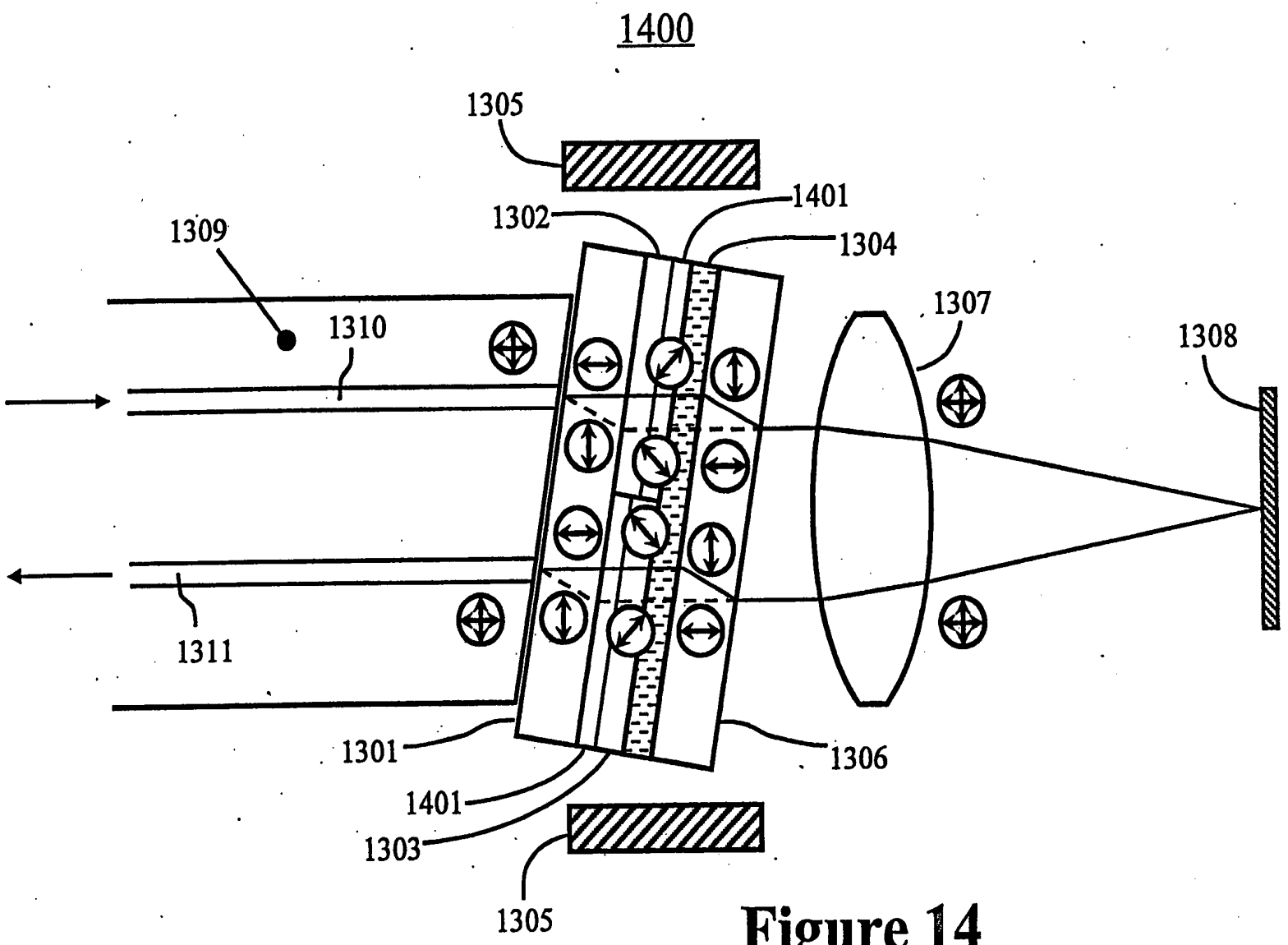
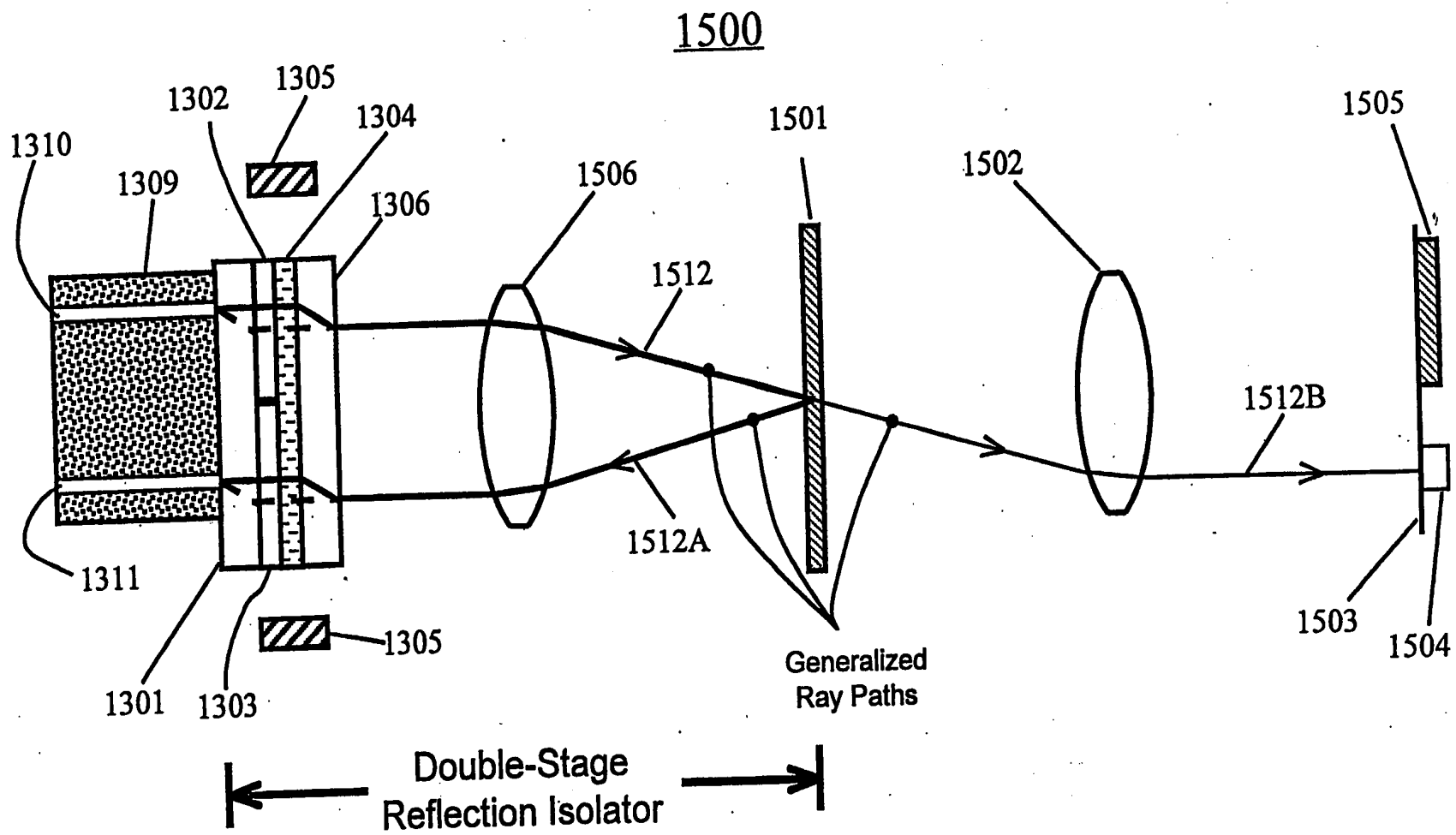

1400
1305
1401
1302
1309
1304
1307
1310
1308
1311
1301
1306
1401
1303
1305

Figure 14

Figure 15


1500
1310
1309
1302
1305
1304
1306
1506
1501
1502
1505
1512
1512B
1512A
1311
1301
1303
1305
1503
1504
Generalized
Ray Paths
Double-Stage
Reflection Isolator

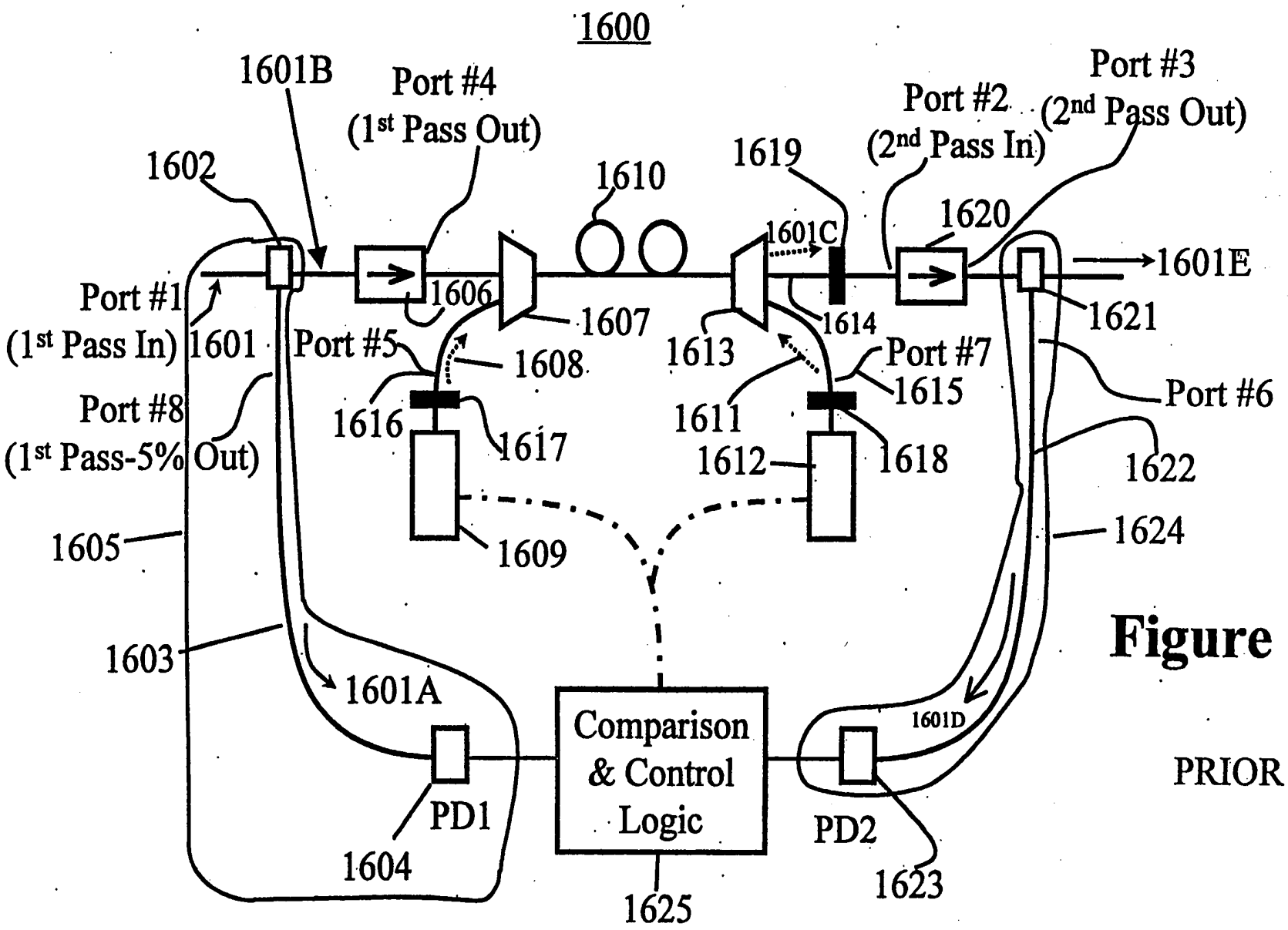


Figure 16

PRIOR ART

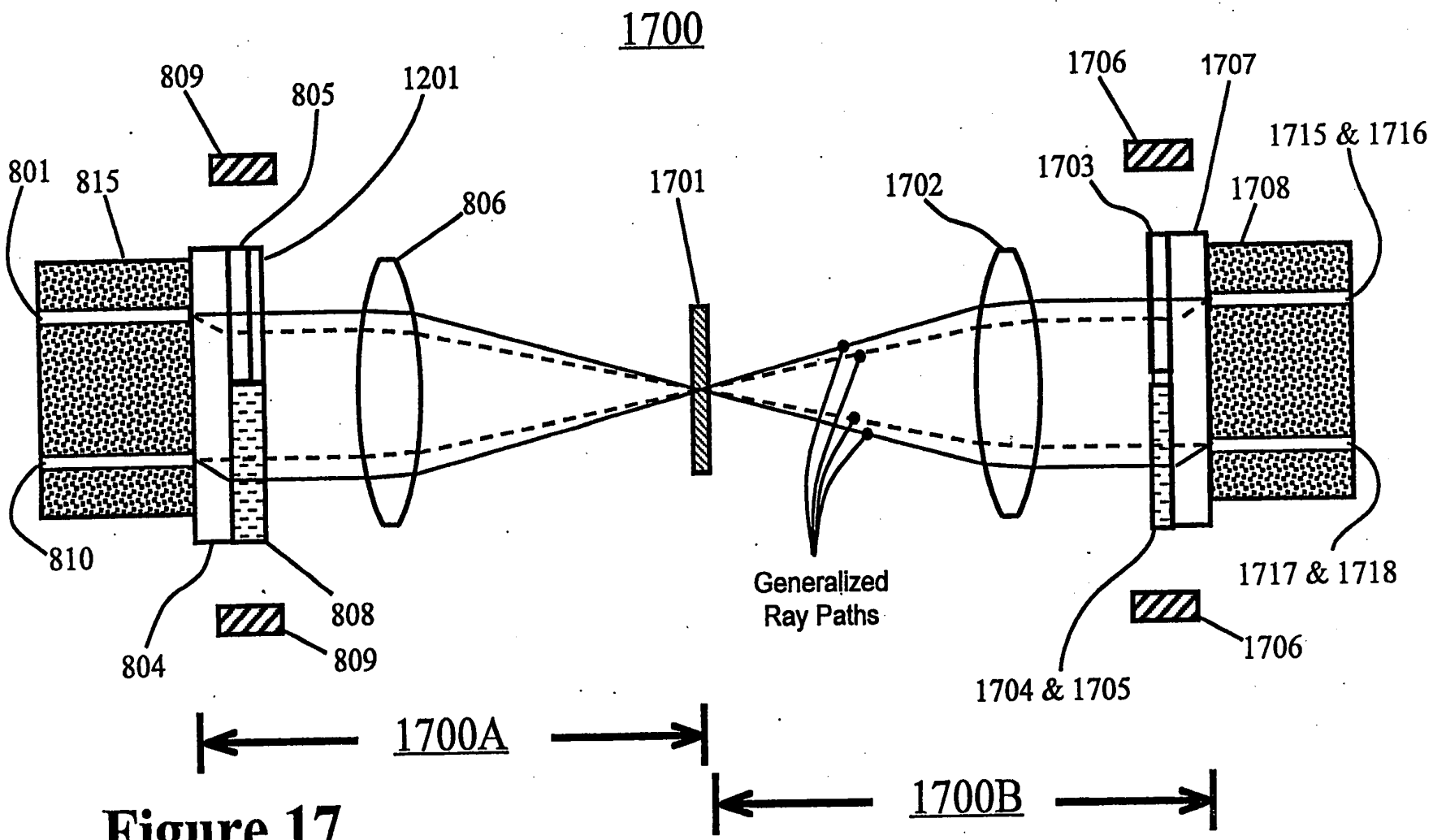

1700
809
805
1201
1706
1707
1715 & 1716
801
815
806
1701
1702
1703
1708
810
808
804
809
Generalized
Ray Paths
1717 & 1718
1706
1704 & 1705
1700A
1700B

Figure 17

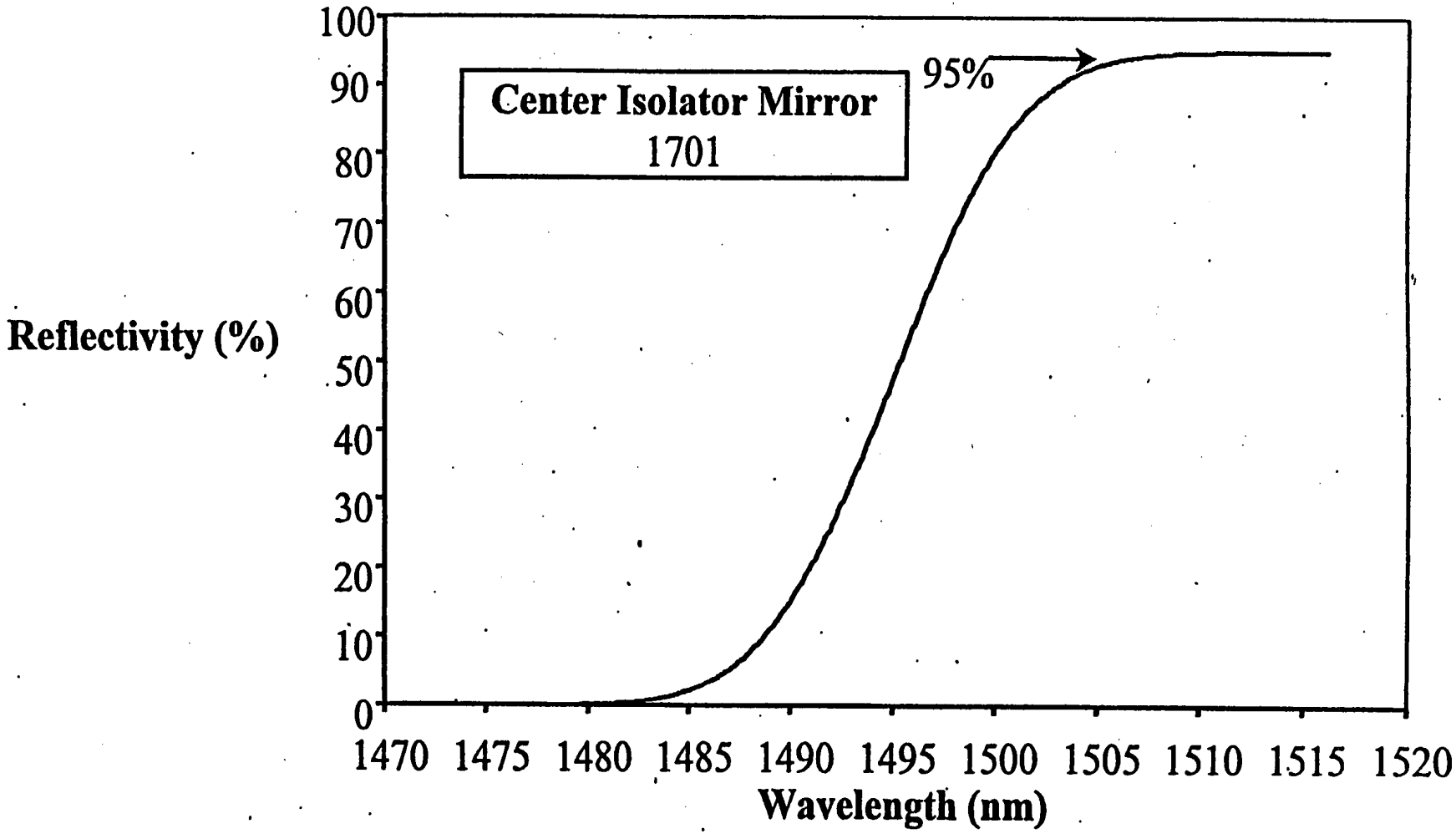

Reflectivity (%)
100
90
80
70
60
50
40
30
20
10
0
Center Isolator Mirror
1701
95%
1470 1475 1480 1485 1490 1495 1500 1505 1510 1515 1520
Wavelength (nm)

Figure 18

Figure 19

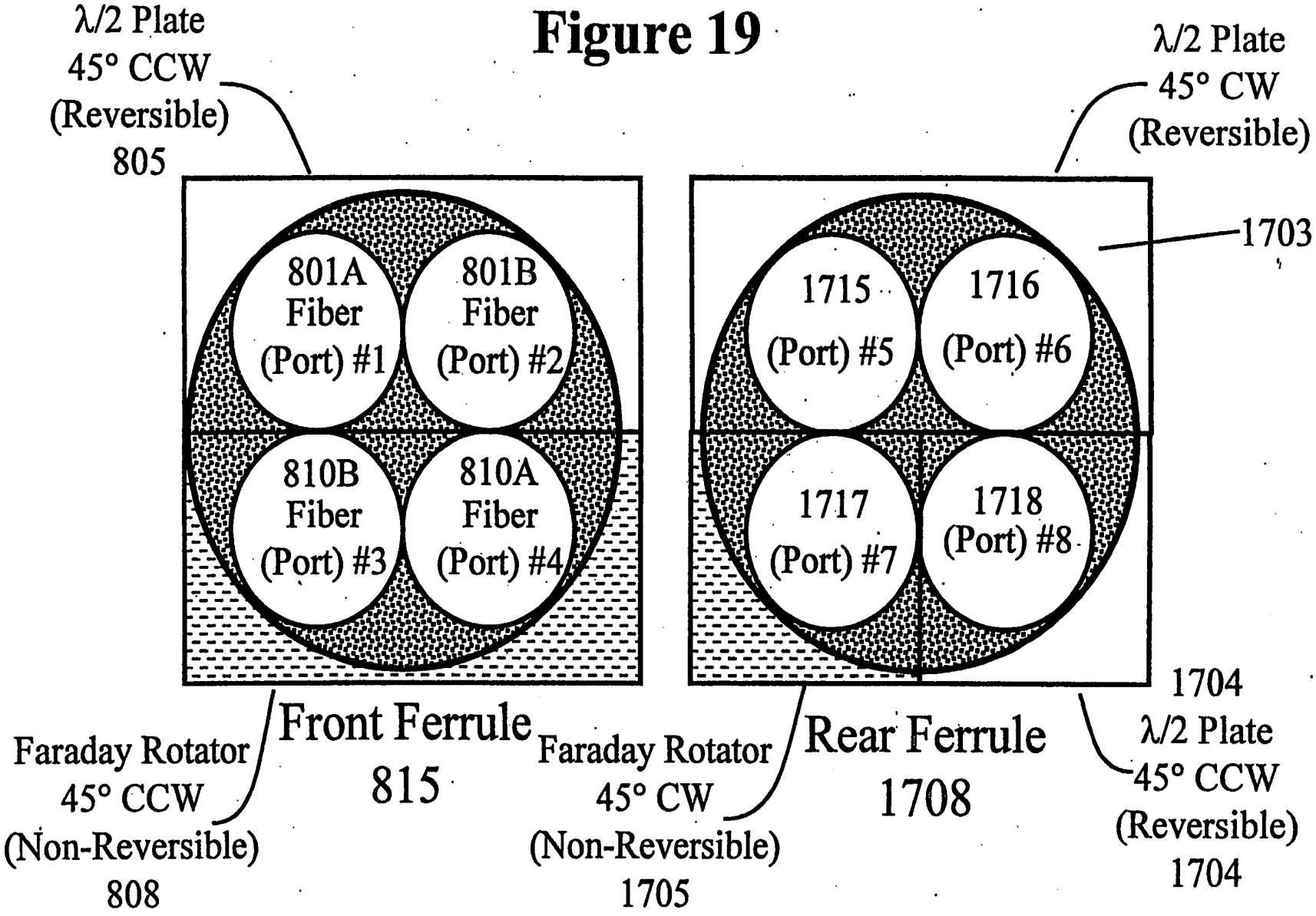
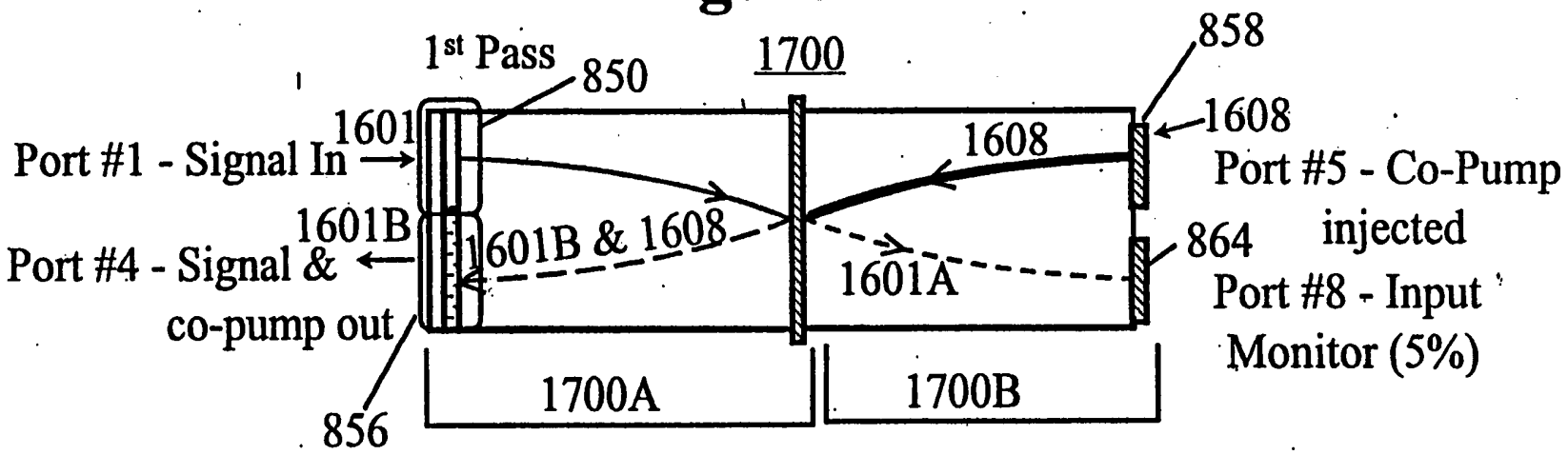

λ/2 Plate
45° CCW
(Reversible)
805
801A
Fiber
(Port) #1
801B
Fiber
(Port) #2
810B
Fiber
(Port) #3
810A
Fiber
(Port) #4
Front Ferrule
815
Faraday Rotator
45° CCW
(Non-Reversible)
808
λ/2 Plate
45° CW
(Reversible)
1703
1715
(Port) #5
1716
(Port) #6
1717
(Port) #7
1718
(Port) #8
Rear Ferrule
1708
Faraday Rotator
45° CW
(Non-Reversible)
1705
1704
λ/2 Plate
45° CCW
(Reversible)
1704

Figure 20A



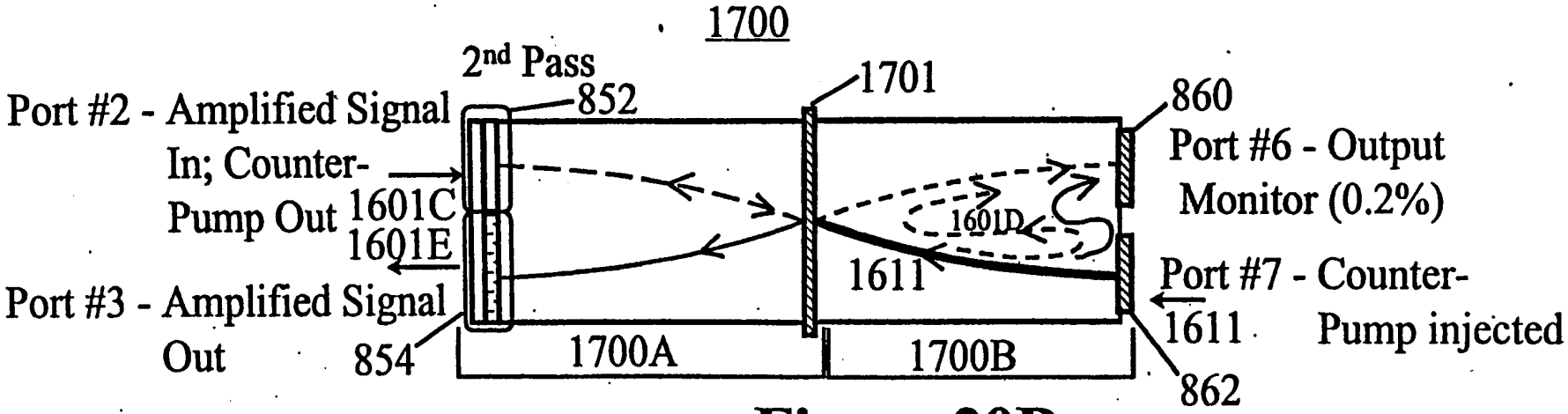


Figure 20B

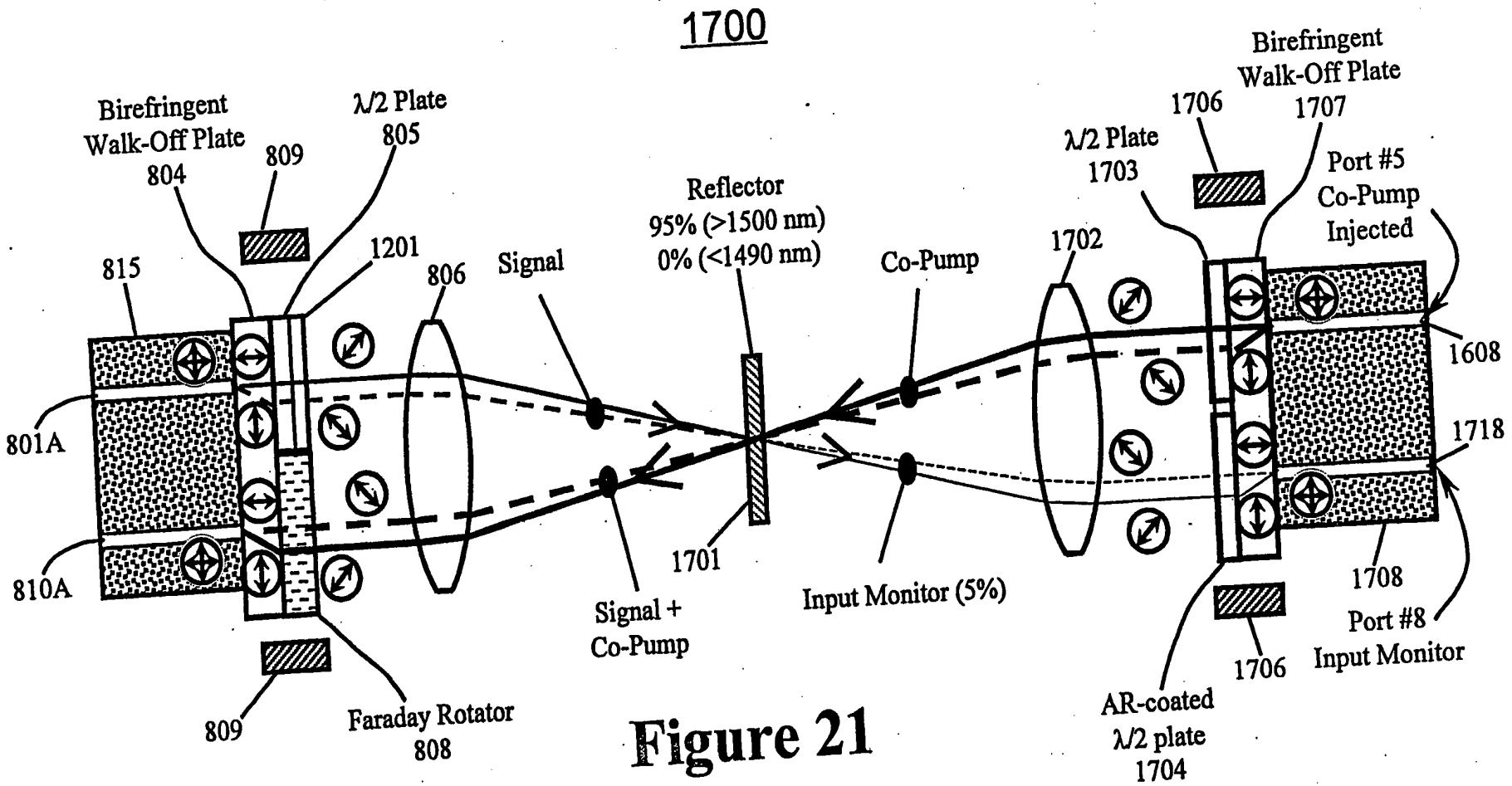

1700
Birefringent
Walk-Off Plate
804
809
λ/2 Plate
805
815
1201
806
Signal
Reflector
95% (>1500 nm)
0% (<1490 nm)
Co-Pump
1702
λ/2 Plate
1703
1706
Birefringent
Walk-Off Plate
1707
Port #5
Co-Pump
Injected
1608
1718
801A
810A
1701
Signal +
Co-Pump
Input Monitor (5%)
1708
Port #8
Input Monitor
1706
809
Faraday Rotator
808
AR-coated
λ/2 plate
1704

Figure 21

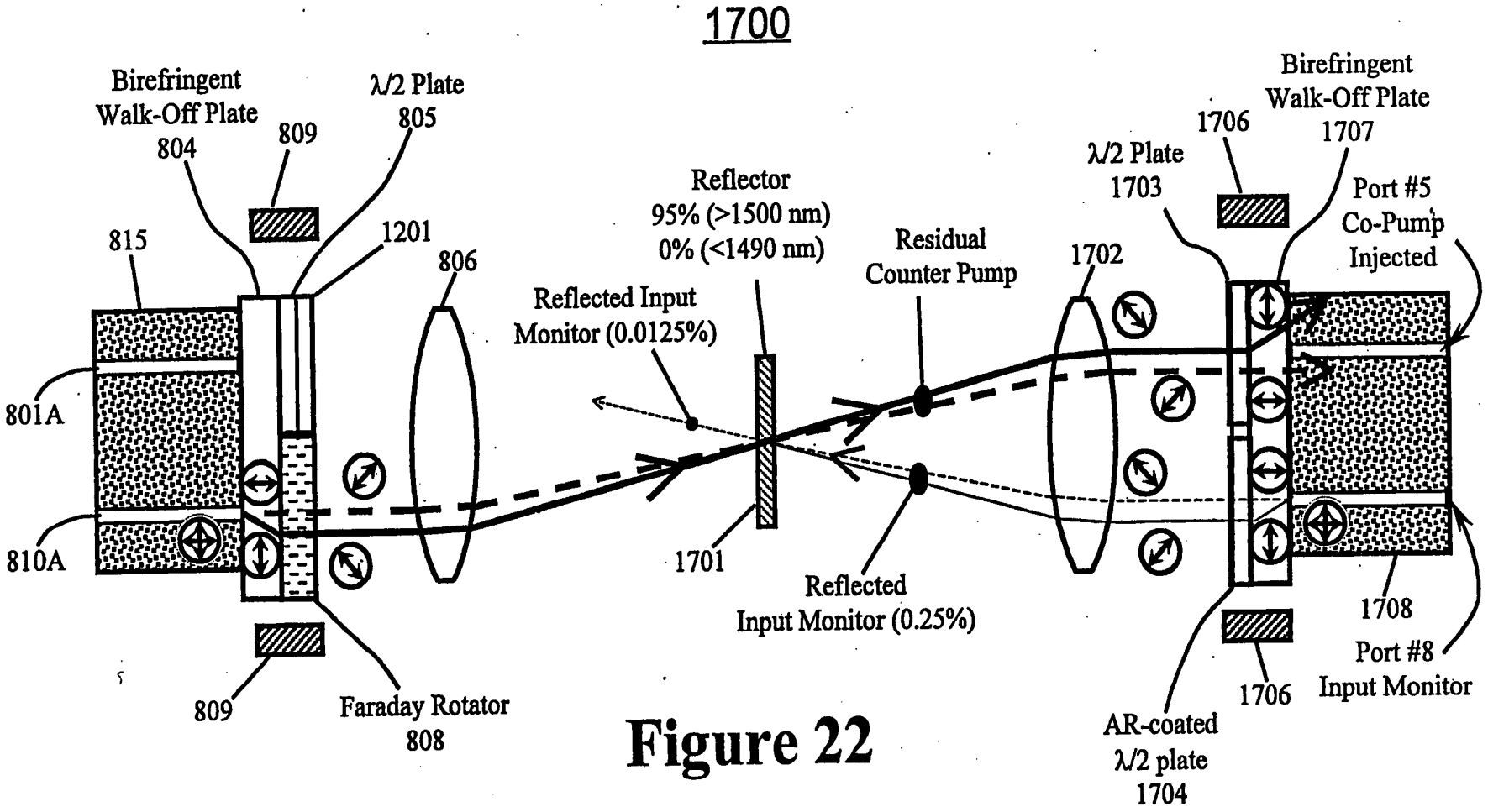

1700
Birefringent
Walk-Off Plate
804
809
λ/2 Plate
805
815
1201
806
801A
810A
809
Faraday Rotator
808
Reflector
95% (>1500 nm)
0% (<1490 nm)
Reflected Input
Monitor (0.0125%)
1701
Residual
Counter Pump
Reflected
Input Monitor (0.25%)
1702
λ/2 Plate
1703
1706
Birefringent
Walk-Off Plate
1707
Port #5
Co-Pump
Injected
1708
Port #8
Input Monitor
1706
AR-coated
λ/2 plate
1704

Figure 22

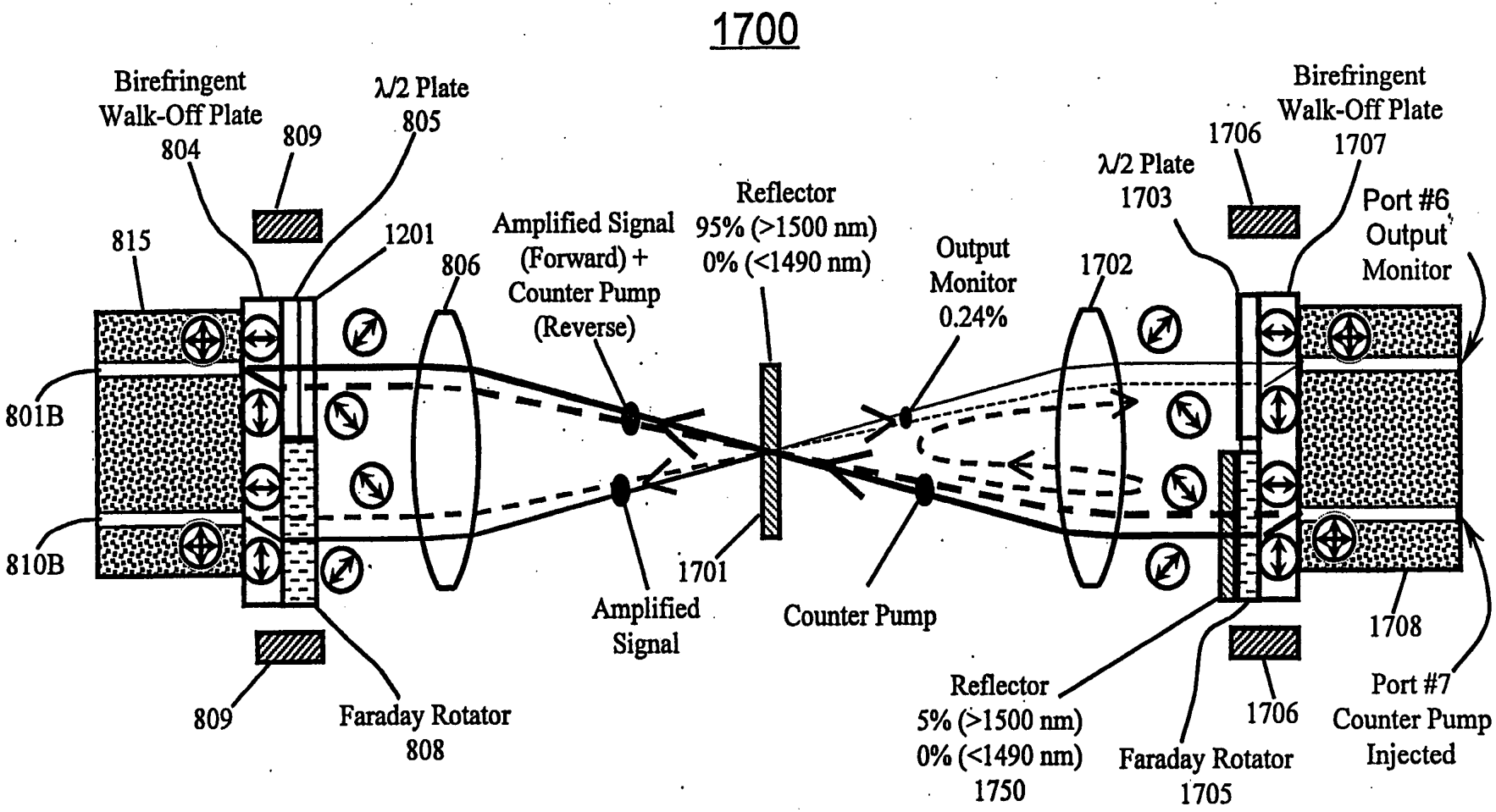

1700
Birefringent Walk-Off Plate 804
809
λ/2 Plate 805
815
1201
806
Amplified Signal (Forward) + Counter Pump (Reverse)
Reflector 95% (>1500 nm) 0% (<1490 nm)
Output Monitor 0.24%
1702
λ/2 Plate 1703
1706
Birefringent Walk-Off Plate 1707
Port #6 Output Monitor
801B
810B
1701
Amplified Signal
Counter Pump
1708
809
Faraday Rotator 808
Reflector 5% (>1500 nm) 0% (<1490 nm) 1750
Faraday Rotator 1705
1706
Port #7 Counter Pump Injected

Figure 23

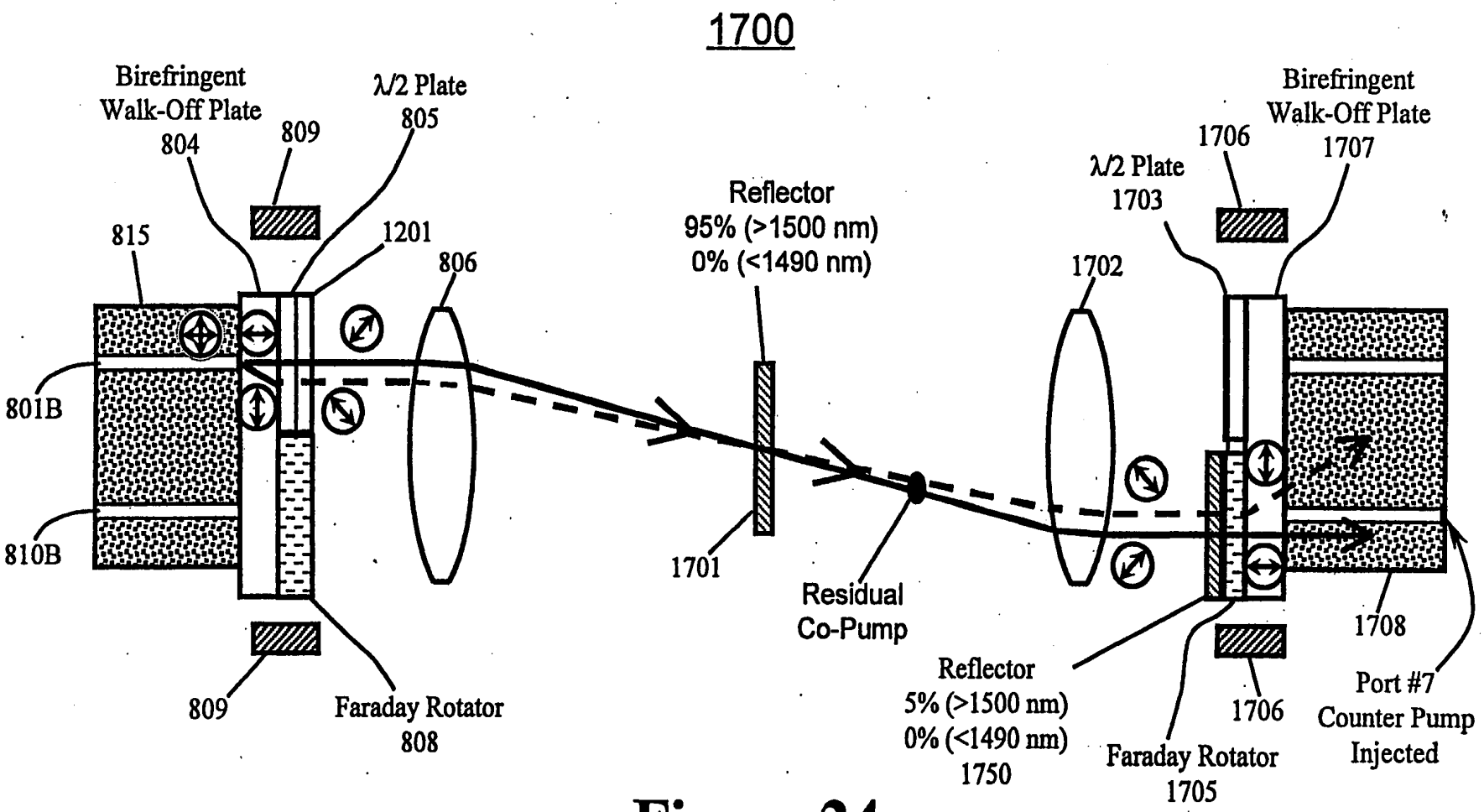

1700
Birefringent
Walk-Off Plate
804
809
λ/2 Plate
805
815
1201
806
801B
810B
809
Faraday Rotator
808
Reflector
95% (>1500 nm)
0% (<1490 nm)
1701
Residual
Co-Pump
1702
λ/2 Plate
1703
1706
Birefringent
Walk-Off Plate
1707
Reflector
5% (>1500 nm)
0% (<1490 nm)
1750
Faraday Rotator
1705
1706
1708
Port #7
Counter Pump
Injected

Figure 24

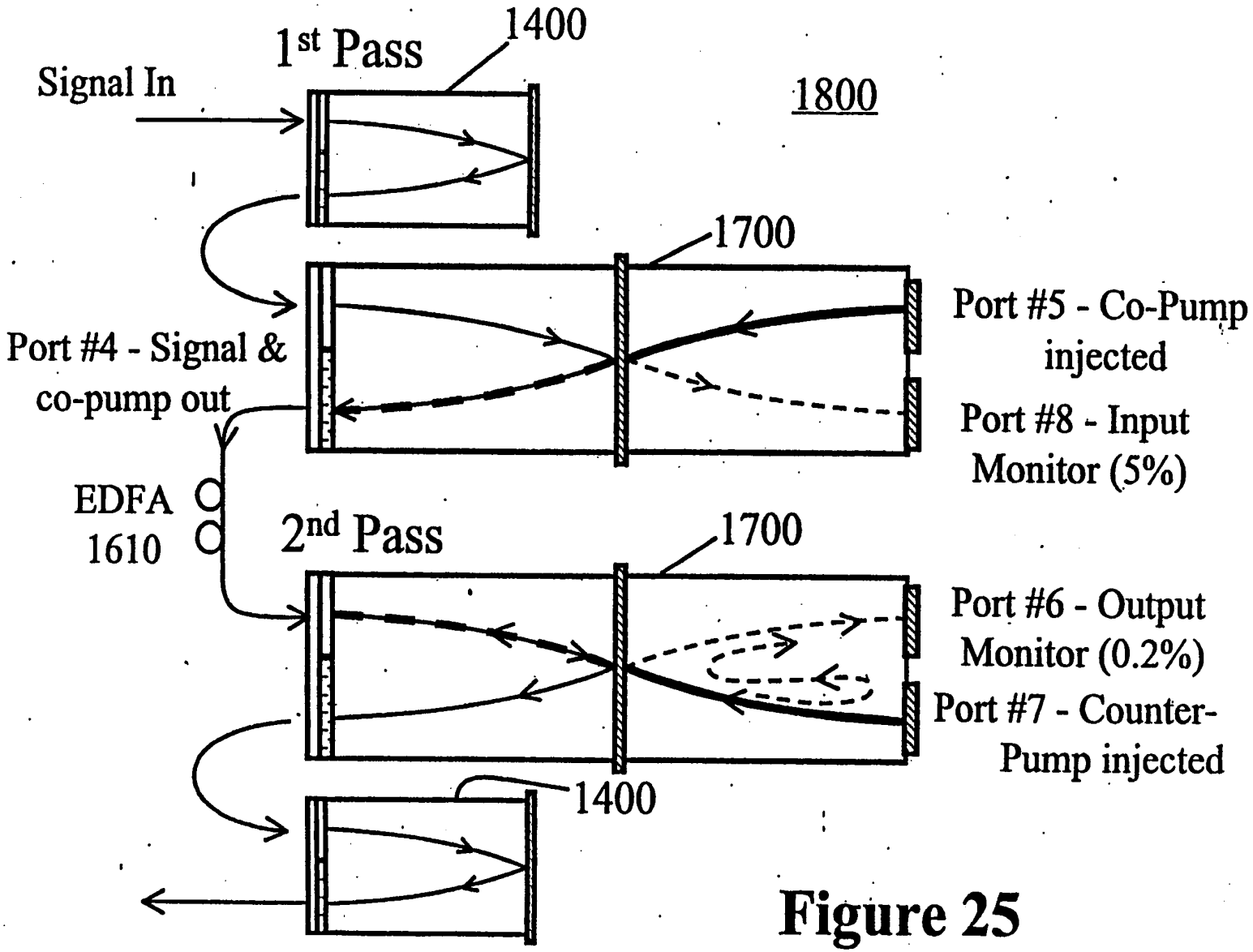

1st Pass
1400
Signal In
1800
1700
Port #5 - Co-Pump injected
Port #4 - Signal & co-pump out
Port #8 - Input Monitor (5%)
EDFA 1610
2nd Pass
1700
Port #6 - Output Monitor (0.2%)
Port #7 - Counter-Pump injected
1400

Figure 25